

What is claimed is:

1. A device to space vertebral members comprising:

first and second linkages each having a first end and a second end with the second linkage having a different length than the first linkage;

5 a pull arm pivotally connected to the first end of each of the first and second linkages; and

a plate connected to the second end of each of the first and second linkages;

10 the pull arm being positioned in a first orientation with the second ends spaced a first distance from the pull arm and the plate at a first angle relative to the pull arm, and a second orientation with the second ends spaced a greater distance from the pull arm than the first distance and the plate at a second angle relative to the pull arm at an angle greater than the first angle.

15 2. The device of claim 1, wherein the plate is substantially parallel with the pull arm in the first orientation.

3. The device of claim 2, wherein the second angle has a maximum range in the second orientation of about 7.5° measured between the plate and a centerline.

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4. The device of claim 1, wherein a pin connects the first end of the second linkage to the pull arm and extends through an elongated slot in the pull arm.

25 5. The device of claim 1, wherein teeth are positioned at the second ends of the first and second linkages, with the second end of the first linkage mating with the second end of the second linkage.

6. The device of claim 1, further comprising an elongated delivery device to position the device between the vertebral members.

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7. The device of claim 6, wherein the elongated delivery device is detachable from the device.

8. The device of claim 1, wherein the second linkage is proximally positioned relative to the first linkage and is longer than the first linkage.

9. The device of claim 1, wherein a first pin attaches the first linkage to the plate and a second pin attaches the second linkage to the plate, with the first pin being spaced apart from the second pin.

10. The device of claim 1, further comprising a push link positioned within the pull arm having a first pin that attaches to the second linkage and a second pin that attaches to a delivery device.

11. A device to space vertebral members comprising:

a first plate and a second plate;

a first linkage pair pivotally attached to the first plate and the second plate;

a second linkage pair pivotally attached to the first plate and the second plate, the second linkage pair being longer than the first linkage pair;

a first toothed end of the first linkage pair attached to the first plate mates with a first toothed end of the second linkage pair, and a second toothed end of the first linkage pair attached to the second plate mates with a second toothed end of the second linkage pair when a distance between the first plate and the second plate increases and an angle formed between the first plate and the second plate changes.

12. The device of claim 11, wherein a total of four linkage pairs are positioned between the first plate and the second plate.

13. A device to space vertebral members comprising:

a first plate;

a second plate;

a pull arm positioned between the first plate and the second plate;

5 a first linkage pair and a second linkage pair each comprising a first end connected to the first plate, a second end connected to the second plate, the first linkage pair connected to the pull arm at a first connection point, and the second linkage pair connected to the pull arm at a second connection point, the first linkage pair having a different length than the second linkage pair;

10 the device positionable between a first orientation having a first height and a second orientation having a second height greater than the first height, a distance between the first connection point and the second connection point being greater in the first orientation than in the second orientation and an angle formed between the plates being different in the first orientation and the second
15 orientation.

14. The device of claim 13, wherein the pull arm further comprises an elongated slot sized to receive a pin to attach the second linkage pair to the pull arm, the pin positioned at a first position along the elongated slot at the first orientation,
20 and a second position along the elongated slot at the second orientation.

15. The device of claim 14, further comprising a push link positioned within the elongated slot, the push link comprising the pin to attach the second linkage pair to the pull arm, and a second pin to attach to a delivery device.

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16. The device of claim 14, wherein the first linkage pair is connected to the pull arm with the first connection point being at the same position relative to the pull arm at the first orientation and the second orientation.

17. The device of claim 13, wherein the first linkage pair is shorter than the second linkage pair, and the angle formed between the plates is greater in the second orientation than at the first orientation.

5 18. The device of claim 13, the first plate is substantially parallel to the second plate in the first orientation.

19. The device of claim 13, wherein teeth at the first and second ends of each the first linkage pair and the second linkage pair operatively connect the first
10 linkage pair with the second linkage pair.

20. A method of spacing vertebral members comprising the steps of:

inserting a spacer in a first orientation with a first height and a first angle between the vertebral members;

15 applying an axial force to a pull arm; and

pivoting linkages attached to the pull arm and increasing the spacer to a second height larger than the first height, and a second angle greater than the first angle.

20 21. The method of claim 20, wherein the step of pivoting the linkages comprises moving the linkages from a first link angle to a second larger link angle.

22. The method of claim 21, wherein the step of pivoting the linkages causes a plate to move outward from a centerline of the spacer to increase the spacer
25 from the first height to the second height and from the first angle to the second angle.

23. A method of spacing vertebral members comprising the steps of:

positioning a spacer between the vertebral members, the spacer being in a first orientation with a first height, a first angle, and a linkage having a first link angle; and

expanding the spacer from the first orientation to a second orientation with a second height greater than the first height, a second angle greater than the first angle, and a second link angle greater than the first link angle.

24. A method of spacing vertebral members comprising the steps of:

positioning a spacer in a closed orientation between the vertebral members with a first link at a first angle and the second link at a second angle greater than the first angle by a first amount;

expanding an overall height and an overall angle of the spacer to an intermediate orientation, the first angle and the second angle changing with the second angle remaining greater than the first angle by the first amount; and

expanding the spacer from the intermediate orientation to an open orientation with the overall height and overall angle increasing with the first angle and the second angle changing and the second angle remaining greater than the first angle by the first amount.